

FOUR NEW SPECIES OF FREE-LIVING MARINE
NEMATODES IN THE GENUS *PAEURYSTOMINA*
(NEMATODA: ENOPLIDA) WITH OBSERVATIONS ON
OTHER MEMBERS OF THE GENUS

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Abstract.—Four new species of *Paeurystomina* and the male of *P. flagellicaudata* are described for the first time from sediments in St. Andrew Bay and the Gulf of Mexico, Bay County, Florida, U.S.A. Additional information is provided for *P. bissonettei*, *P. floridensis*, and *P. acuminata*. *P. americana* n. sp. and *P. vaughtae* n. sp. differ from one another in the shape of the spicules and gubernaculum, and from *P. atypica* in the location of the excretory pore and shape of the spicules and gubernaculum. *P. parafloridensis* n. sp. differs from *P. floridensis* in the number of circles of denticles in the stoma and in the size and arrangement of the denticles. *P. alima* n. sp. differs from *P. parafloridensis* n. sp. in the number of circles of denticles in the stoma, in the absence of a gubernaculum, and in the shape of the spicules. It differs from *P. agubernacula* in the number of circles of denticles in the stoma and the length and shape of the spicules. The genus *Megeurystomina* is placed in synonymy with *Paeurystomina*, and *M. combesi* becomes *P. combesi* n. comb. A key to the species of the genus *Paeurystomina* is given.

The genus *Paeurystomina* Micoletzky & Kreis, 1930, was erected for those species of free-living marine nematodes of the subfamily Eurystomininae Filipjev, 1921, in which the spinneret and caudal glands are absent, and the terminus of the tail is acute. Wieser (1959) described *Paeurystomina pugetensis*, described the cervical setae as flattened in this species, and reviewed the known species in the genus. He recognized as valid only those species for which males had been described. He expressed doubt as to the inclusion of *Paeurystomina tenuicauda* Stekhoven, 1950, in the genus because circles of denticles are absent from the stoma in this species whereas they are present in all other species in the genus. Luc & De Coninck (1959) described *Paeurystomina armorica* and provided a key to six species of the genus.

Chitwood (1960) described *Paeurystomina atypica* and provided a key to the nine

species then in the genus and included *P. tenuicauda*. The key used a number of characters to differentiate the species including the number of circles of denticles in the stoma, tail length, length of spicules, and presence or absence of flattened cervical setae. He also recognized the problem of the absence of male descriptions for some species.

Hopper (1963) discussed the presence of large hypodermal gland cells in *Paeurystomina*. Hopper (1970) described *Paeurystomina bissonettei*, discussed the presence of flattened cervical setae, the arrangement of the denticles in the stoma in *Paeurystomina*, and emended the description of *P. atypica* to include flattened cervical setae. Lamshead & Platt (1979) described a new genus *Batheurystomina*, provided a tabular key to the genera of the Eurystomininae, and discussed each genus in the subfamily. They considered male specimens to be critical to an understanding of the Eurystomi-

ninae. They considered *Eurystomina repanda* Wieser, 1959, to be a synonym of *P. pugetensis* based on the presence of flattened cervical setae and similarity of the male genital apparatus. They considered all species of *Pareurystomina* for which males are unknown as species dubiae, and *P. tenuicauda* was considered species dubia due to the absence of information pertaining to the stoma.

Collections of free-living marine nematodes from various habitats in St. Andrew Bay, and the Gulf of Mexico, Bay County, Florida, U.S.A. from 1981–1987 yielded 174 specimens of nine species in the genus *Pareurystomina*. The purpose of this paper is to describe the species collected, provide some additional information for known species and present a key to the species of the genus *Pareurystomina*.

Specimens were recovered from sediment from a number of subtidal sites in the above-mentioned waterbodies with core samplers of variable diameters. Nematodes were extracted from the samples by repeated washing of the sediment in water from the site. Nematodes were removed alive from the settled material of the final washing, fixed in hot alcohol-formalin-acetic acid or hot 4% formalin in sea water for 24 h and dehydrated and mounted in anhydrous glycerine on Cobb slides.

All measurements are given in μm unless otherwise stated, and the mean is followed by the range in parentheses. The spicular lengths are given as the chord of the arc unless otherwise indicated. The taxonomic hierarchy is from Gerlach & Riemann (1974). Type specimens and specimens of known species have been deposited in the U.S. National Museum of Natural History (USNM) and the Florida Nematode Collection, University of Florida, Gainesville (FNC).

Taxonomic Account

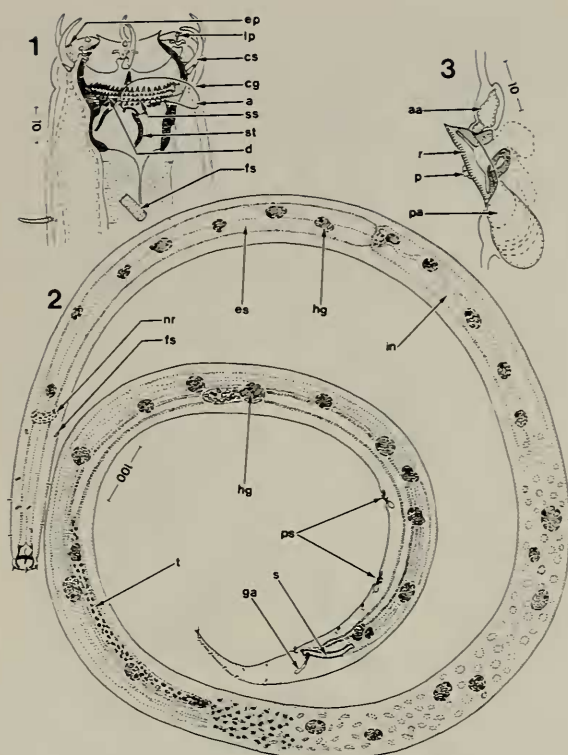
The specimens of *Pareurystomina* collected during this study presented a variety

of spicular and gubernacular shapes and sizes, a variable number of circles of denticles in the stoma, and a variety of denticular shapes and arrangements. Particular emphasis was given to placing males collected during this study with previously described species in which the males are unknown. The characters used to place males with females were the number of circles of stomatal denticles, shape and size of the denticles in each circle, tail length, size of amphid, and location of the excretory pore. Comparison of males with males of recognized species included the above characters as well as the shape of the male genital apparatus.

All specimens examined during this study have the following features in common (Figs. 1–3). Body size and shape is variable within a species as evidenced by the wide range of lengths and wide range of the demanian “a” values in some species. The cuticle is thin and smooth, and the terminus of the tail is acute. Caudal glands and spinneret were not observed. Hypodermal gland cells are present and arranged as described by Hopper (1963, 1970). The gland cells are more prominent and abundant in some species than in others. The head is retracted in some specimens which gives the appearance of an anterior displacement of the amphid and cephalic setae. The head has six small lips each with a papilla, and a single circle of 10 (6 + 4) cephalic setae. Four of the submedian cephalic setae are shorter than the other six cephalic setae. The lip region is delineated from the remainder of the head by a cephalic groove. The amphid is large, wider than long, and located over the stoma. Stoma is large with heavily cuticularized walls and is divided into an anterior and posterior chamber by a stomatal suture at about midlevel. The stoma has a single, large, right subventral tooth and a variable number of circles of denticles. The circles of denticles can be complete or interrupted on the right subventral wall of the stoma as described by Hopper (1970). The excretory pore is anterior to the level of the cephalic

setae. Cervical setae are compressed and appear flattened with a broad base and terminus. The width and length of these setae vary somewhat among species. The female reproductive system is amphidelphic and the ovaries are antidromous. Males have two spicules, and two cuticularized, cup-shaped, pre-anal supplements. Two exceptions to these statements were observed during this study; a single male of *P. floridensis* with only one pre-anal supplement and a male of *P. floridensis* in which the gubernaculum was absent. Gerlach (1952) described a male of *Pareurystomina acuminata* (De Man, 1889) with a single pre-anal supplement. A gubernaculum is absent or reduced in some species of *Pareurystomina*.

The characters of most value in differentiating the species of *Pareurystomina* are the shape and size of the spicules and the presence or absence and shape of the gubernaculum. The number of circles of denticles in the stoma, the shape of the denticles in each circle, tail length and position of the excretory pore were also of value in differentiating both males and females of the various species. The use of the number of circles of denticles in the stoma can be a problem because the posterior circles are often incomplete. Hopper (1970), in the description of *P. bissonettei*, noted that the fewest rows of denticles occur on the wall of the stoma from which the large subventral tooth originates, and the largest number of rows of denticles occurs on the stomatal wall opposite the origin of the subventral tooth. The presence of partial circles of denticles and the location of the interruption requires examination from lateral aspects in order to determine accurately the maximum number of denticular circles in the stoma. Some descriptions of *Pareurystomina* species are not clear as to whether the maximum or minimum number of denticular circles is stated. It is assumed, for purposes of this paper, that the stated or figured number of circles of denticles for each pre-



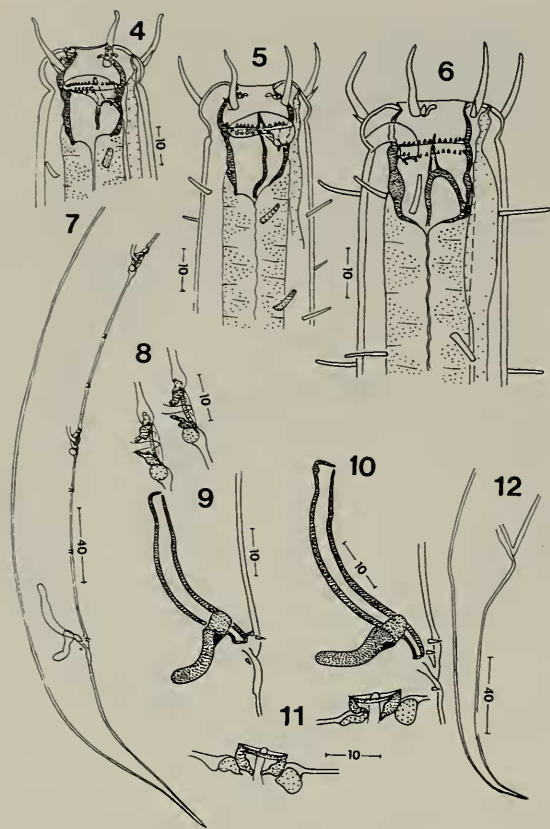
Figs. 1-3. *Pareurystomina floridensis*: 1, Male, head, lateral view; 2, Entire male, lateral view; 3, Male, anterior pre-anal supplement, lateral view. Scale bars in μm . Legend: a = amphid. aa = anterior apophysis. cg = cervical groove. cs = cephalic setae. d = denticles. ep = excretory pore. es = esophagus. fs = flat cervical setae. ga = gubernacular apophysis. hg = hypodermal gland cell. in = intestine. lp = labial papilla. nr = nerve ring. p = papilla. pa = posterior apophysis. ps = pre-anal supplement. r = rim of cup. s = spicule. ss = stomatal suture. st = subventral tooth. t = testis.

viously described species is the maximum number.

Wieser (1959) recognized that the size and shape of the denticles can vary between circles in *Pareurystomina* and used these differences with other characters to distinguish the species. In the specimens examined during this study, the size and shape of the denticles varied between circles in some species but were of the same size and shape within a given circle in the same species.

Pareurystomina americana, new species Figs. 4-12

Diagnosis. — (Ten males, 3 females and 5 juveniles from St. Andrew Bay.) Body long, slender. Four submedian cephalic setae



Figs. 4–12. *Pareurystomina americana*: 4, Male paratype, head, lateral view; 5, Male holotype, head, lateral view; 6, Male paratype, head, lateral view; 7, Male holotype, posterior end, lateral view; 8, Male holotype, pre-anal supplements, lateral view (anterior, left; posterior, right); 9, Male holotype, right spicule and gubernaculum, lateral view; 10, Male paratype, right spicule and gubernaculum, lateral view; 11, Male paratype, pre-anal supplements, lateral view (anterior, left; posterior, right); 12, Female, posterior end, lateral view. Scale bars in μm .

about $\frac{1}{3}$ length of other 6. Flat cervical setae with narrow base present from base of stoma to about $\frac{1}{2}$ distance to nerve ring; one male with additional setae for about $\frac{1}{2}$ distance from nerve ring to base of esophagus. Somatic setae not observed; caudal setae sparse in male, not observed in female. Amphids over midlevel of stoma. Single complete circle triangular denticles and one incomplete circle small, round denticles anterior to stomatal suture; single incomplete circle large, triangular denticles posterior to suture. Excretory pore anterior to cephalic setae. Tail conical with acute terminus.

Males ($n = 6$): Length 4.52 mm (4.24–

4.94), width at midbody 35.8 (30–43). Head diameter 27 (25–29) at level of cephalic setae; cephalic setae 15 (14–17) and 5.3 (5–6) long. Amphid 13.7 (13–16) wide. Stoma 24.2 (23–26) long, 17.5 (16–19) wide. Esophagus 0.964 mm (0.730–1.10) long; nerve ring 188.2 (179–195) from anterior end. Tail 140.2 (138–163) long, 34.2 (32–37) wide at anus. Two midventral, cuticularized, cup-shaped, pre-anal supplements present 119 (107–136) and 228 (208–248) anterior to anus. Posterior apophysis of each supplement larger than anterior; rim of cup striated. Two pairs subventral papillae between anus and first pre-anal supplement; two pairs subventral papillae between first and second pre-anal supplements. Two pairs subventral setae immediately anterior to anus; subventral, lateral, subdorsal setae present posterior to anus. Spicules gently curved 41.8 (37–45) long; tips blunt, barb absent. Gubernaculum with narrow corpus surrounding spicules; gubernacular apophysis 14.7 (14–16) long, bent dorsally at midpoint. $a = 125.9$ (114.9–147.8); $b = 4.77$ (3.96–6.03); $c = 30.8$ (27.0–33.6).

Females ($n = 3$): Length 4.19 mm (3.36–4.65), width at midbody 42.3 (42–45). Head diameter 28.7 (28–30) at level of cephalic setae; cephalic setae 15 (14–17) and 5.3 (5–6) long. Amphid 12.3 (11–13) wide. Stoma 24 (22–26) long and 18.7 (18–19) wide. Esophagus 848 (789–896) long, nerve ring 182.3 (171–200) from anterior end. Tail 186.7 (165–203) long, 33.7 (32–35) wide at anus. Vulva 2.76 mm (2.15–3.11) from anterior end. $a = 98.7$ (84.0–110.7); $b = 4.92$ (4.26–5.31); $c = 23.7$ (17.5–31.2); $V = 65.7\%$ (64–68).

Type specimens.—Holotype male, USNM 77137; paratype males, USNM 77138–77140; allotype female, USNM 77141; paratype female, USNM 77142. Paratype males, FNC A-144 and A-146.

Type locality.—Holotype male from non-vegetated sediment from the north shore of St. Andrew Bay, Bay County, Florida 0.3 km west of the inlet to Lake Caroline

(85°41'10"W, 30°09'45"N). Also in vegetated and nonvegetated sediment from Freshwater Bayou, St. Andrew Bay, Bay County, Florida, (85°39'00"W, 30°07'30"N).

Etymology. — Named for the place of collection, America.

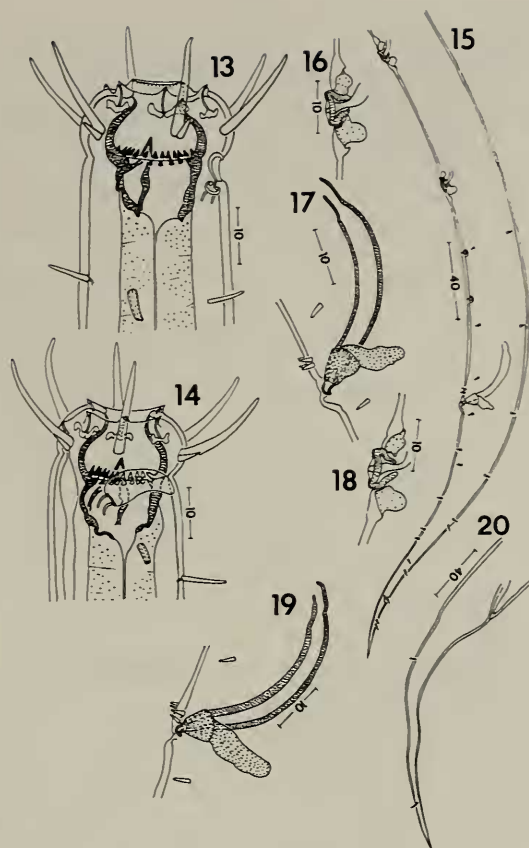
Remarks. — *Pareurystomina americana* is most similar to *Pareurystomina atypica* Chitwood, 1960, from which it differs in the location of the excretory pore (anterior to cephalic setae vs. 104 from anterior end), in the width of the amphid (11–16 vs. 7), in the shape of the spicules (blunt tip vs. narrow, pointed tip) and in the shape of the gubernacular apophysis (bent dorsally vs. bent ventrally). *P. americana* is also similar to *P. vaughtae* described next but differs from *P. vaughtae* in the shape of the spicules (absent of barb at tip), the corpus of the gubernaculum is not conical and the gubernacular apophysis is bent dorsally rather than straight.

Pareurystomina vaughtae, new species

Figs. 13–20

Diagnosis. — (Five males, 3 females, and 3 juveniles from mouth of Freshwater Bayou and Grand Lagoon, St. Andrew Bay.) Body long, slender. Four submedian cephalic setae about 28% length of other 6. Flat cervical setae narrow; present from base of stoma almost to nerve ring. Somatic setae sparse; caudal setae abundant in males, sparse in females. Amphids over midlevel of stoma. Single complete circle large triangular denticles anterior to stomatal suture, single incomplete circle large, triangular denticles posterior to suture. Excretory pore anterior to cephalic setae. Tail conical with acute terminus.

Males (n = 5): Length 3.24 mm (2.63–4.70), width at midbody 33.8 (30–37). Head diameter 26.6 (26–29) at level of cephalic setae; cephalic setae 18.1 (16–20) and 4.8 (4–5) long. Amphid 11.4 (11–12) wide. Stoma 24.6 (24–27) long, 17.2 (16–18) wide. Esophagus 713.2 (606–936) long; nerve ring 179 (168–200) from anterior end. Tail 138



Figs. 13–20. *Pareurystomina vaughtae*: 13, Male holotype, head, ventral view; 14, Male paratype, head, lateral view; 15, Male holotype, posterior end, lateral view; 16, Male, anterior pre-anal supplement, lateral view; 17, Male holotype, left spicule and gubernaculum, lateral view; 18, Male holotype, anterior pre-anal supplement, lateral view; 19, Male paratype, left spicule and gubernaculum, lateral view; 20, Female, tail, lateral view. Scale bars in μm .

(126–144) long, 31.6 (29–35) wide at anus. Two cuticularized, cup-shaped, midventral, pre-anal supplements present 118.8 (114–136) and 200.4 (184–216) anterior to anus. Posterior apophysis of each supplement larger than the anterior; rim of cup not striated. Two pairs subventral papillae between anus and first pre-anal supplement. Two pairs subventral setae immediately anterior to anus. Spicules 41.8 (38–45) long, gently curved, tip with small barb. Corpus of gubernaculum 7.2 (6–8) long, conical, surrounds distal end of spicules; gubernacular apophysis straight, 11 (8–13) long, directed dorsally. Post-anal setae abundant. a = 95.0 (80.0–127.0); b = 4.50 (3.95–5.02); c = 23.4 (18.7–32.6).

Females (n = 3): Length 3.32 mm (3.07–3.54), width at midbody 45.3 (43–48). Head diameter 28.3 (27–29) at level of cephalic setae; cephalic setae 19.3 (18–21), 4.7 (4–5) long. Amphid 11.7 (11–13) wide. Stoma 23.3 (22–24) long, 19 (18–20) wide. Tail 166.3 (163–168) long, 34.7 (32–37) wide at anus. Vulva 2.05 mm (1.91–2.16) from anterior end. a = 73.4 (63.9–78.7); b = 3.83 (3.69–4.02); c = 19.9 (18.8–21.1); V = 61.7% (61–62).

Type specimens.—Holotype male, USNM 77143; paratype males, USNM 77144–77145; allotype female, USNM 77146. Paratype male, FNC A-155; paratype female, FNC A-156.

Locality.—Holotype from sediments in a bed of Shoalgrass (*Halodule wrightii*) at the mouth of Freshwater Bayou, St. Andrew Bay, Bay County, Florida (85°39'00"W, 30°07'30"N). Other site, Grand Lagoon off St. Andrew Bay, Bay County, Florida (85°43'15"W, 30°07'50"N).

Etymology.—Named for Ms. Rosalie Vaught, librarian. This and other studies could not have been completed without her voluntary dedication to obtaining the required literature.

Remarks.—*Pareurystomina vaughtae* is most similar to *P. americana* but differs from it in the presence of the large cone-shaped corpus of the gubernaculum, straight rather than bent gubernacular apophysis, and the presence of two rather than three circles of denticles in the stoma. *P. vaughtae* is also similar to *P. armorica* in the presence of two circles of denticles in the stoma. It differs from that species in that the excretory pore is anterior to the cephalic setae rather than at the cephalic groove, the amphid is larger (50% of head diameter vs. 31% of head diameter), and the tail is shorter (4.8 anal diameters vs. 6 anal diameters).

Pareurystomina parafloridensis, new species
Figs. 21–28

Diagnosis.—(Eleven males, 4 females and 6 juveniles from various sites in St. Andrew

Bay). Body long, broad. Four submedian cephalic setae about $\frac{1}{3}$ length of other 6. Flat cervical setae broad; present from base of stoma almost to nerve ring. Somatic setae and caudal setae sparse. Amphids over mid-level of stoma. Stoma with 4 circles of denticles anterior to stomatal suture, one circle posterior to suture. Last circle anterior to suture and circle posterior to suture incomplete. Small triangular denticles in anterior-most 4 circles uniform in size within each circle and between circles. Posterior-most circle with larger triangular denticles. Excretory pore anterior to cephalic setae. Male tail, short, conical with acute terminus. Female tail longer, conical then narrow to acute terminus.

Males (n = 6): Length 4.59 mm (3.95–5.10), width at midbody 70 (61–75). Head diameter 37.3 (37–38) at level of cephalic setae; cephalic setae 16.3 (15–18) and 5 (4–6) long. Amphid 20.3 (19–21) wide. Stoma 30.2 (29–32) long, 24.6 (24–26) wide. Esophagus 1.02 mm (0.971–1.08) long; nerve ring 230.7 (224–242) from anterior end. Tail 188.8 (157–222) long, 57.5 (56–61) wide at anus. Two cuticularized, cup-shaped, midventral, pre-anal supplements present 179.5 (152–208) and 295 (240–360) anterior to anus. Posterior apophysis of each supplement about twice size of anterior apophysis; rim of cup striated. Two pairs small subventral papillae immediately anterior to anus and another more lateral pair posterior to anus. Spicules 78.3 (75–82) long, gently curved then recurved at tip; tip broad with large barb. Gubernaculum with small corpus and narrow apophysis 34.3 (32–38) long; lateral parts of apophysis more heavily cuticularized; apophysis directed almost dorsally. a = 65.3 (60.3–70.8); b = 4.51 (3.91–4.95); c = 24.5 (20.6–27.7).

Females (n = 4): Length 4.39 mm (3.63–4.96), width at midbody 104.8 (99–109). Head diameter 37.5 (34–40) at level of cephalic setae; cephalic setae 17 (16–18) and 5.5 (5–6) long. Amphid 18.8 (18–19) wide. Stoma 32 (30–34) long, 27.3 (26–29) wide.

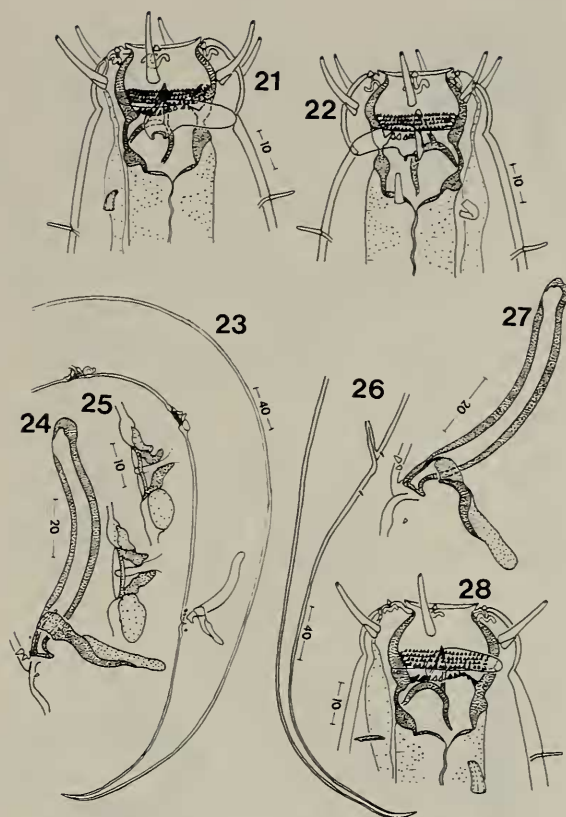
Esophagus 1.06 mm (0.846–1.12) long; nerve ring 240.8 (213–254) from anterior end. Tail 283.5 (258–323) long, 52 (48–54) wide at anus. Caudal setae restricted to anal region. Vulva 2.68 mm (2.03–3.12) from anterior end. $a = 43.7$ (36.7–51.7); $b = 4.15$ (3.94–4.31); $c = 15.5$ (14.0–17.1); $V = 62\%$ (60–64).

Type-specimens.—Male holotype, USNM 77147; male paratypes, USNM 77148–77149; female allotype, USNM 77150; female paratype, USNM 77151. Paratype males, FNC A-152, A-153; female paratype, FNC A-154.

Locality.—Holotype male from sediments in a bed of shoalgrass (*Halodule wrightii*) in Grand Lagoon, St. Andrew Bay, Bay County, Florida (85°43'15"W, 30°07'50"N). Other locality, sediments in a bed of manatee grass (*Syringodium filiforme*) at mouth of Freshwater Bayou, Bay County, Florida (85°39'00"W, 30°07'30"N).

Etymology.—From the Greek para meaning beside and floridensis referring to *Pareurystomina floridensis*.

Remarks.—*Pareurystomina parafloridensis* is similar to *P. floridensis* in the length and shape of the spicules and gubernaculum in males and most characters in females. *P. parafloridensis* differs from *P. floridensis* primarily in the number of circles of denticles in the stoma and the shape and size of the denticles in each circle. *P. parafloridensis* has five circles of stomatal denticles and the anterior four circles are of equal size and shape; each denticle is a small triangular structure. The posterior-most circle has larger triangular denticles. In *P. floridensis* there are three to four circles of denticles of variable size and shape; the denticles of the anterior-most circle are large elongate triangles, the following two circles are small and rounded and the posterior circle is large and rounded. *P. parafloridensis* is also similar to *Pareurystomina combesi* (Luc & De Coninck, 1959) n. comb. in the number of rows of denticles in the stoma. It differs from *P. combesi* in that the excretory pore is ante-



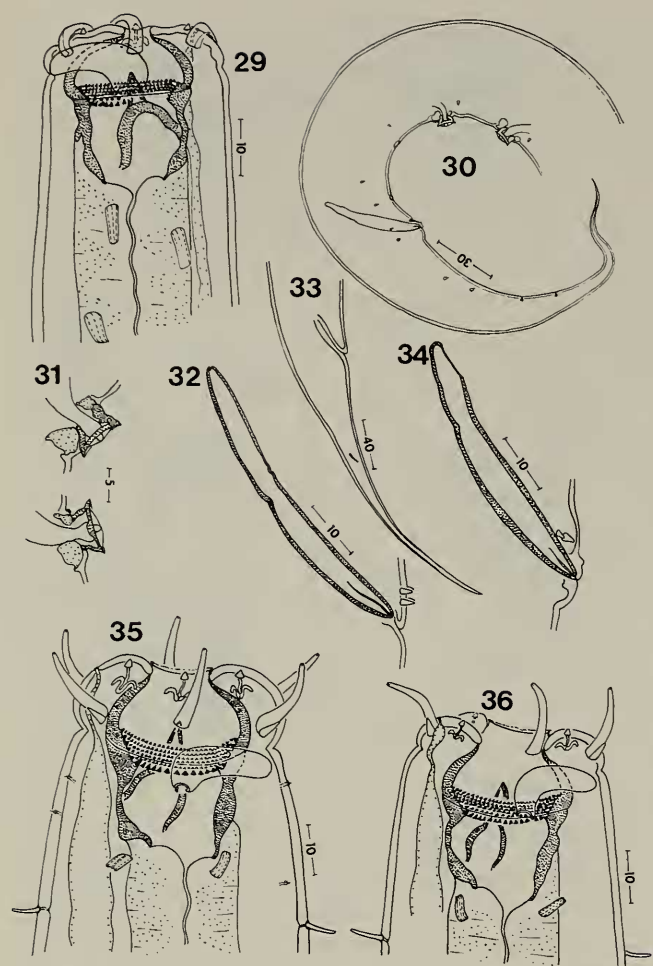
Figs. 21–28. *Pareurystomina parafloridensis*: 21, Male holotype, head, lateral view; 22, Male holotype, head, lateral view; 23, Male holotype, posterior end, lateral view; 24, Male holotype, left spicule and gubernaculum, lateral view; 25, Male holotype, pre-anal supplements, lateral view (posterior, top right; anterior, bottom left); 26, Female, posterior end, lateral view; 27, Male paratype, left spicule and gubernaculum, lateral view; 28, Female, head, lateral view. Scale bars in μm .

rior to the cephalic setae rather than posterior to the cephalic groove and the female tail is longer ($c = 14$ –17.1 vs. $c = 47.8$).

Pareurystomina alima, new species

Figs. 29–36

Diagnosis.—(Four males, 3 females, and 5 juveniles from mouth of Freshwater Bayou and Grand Lagoon, St. Andrew Bay). Body short, broad. Four submedian cephalic setae about $\frac{1}{4}$ length of other 6. Flat cervical setae broad; extend from base of stoma to nerve ring; somatic setae not observed; caudal setae present. Amphids over level of stomatal suture when relaxed, anterior to stomatal suture when contracted. Denticles in 2 broad bands of 3 circles each;



Figs. 29–36. *Paurystomina alima*: 29, Male holotype, head, right lateral view (contracted); 30, Male holotype, posterior end, lateral view; 31, Male holotype pre-anal supplements, lateral view (anterior, top; posterior, bottom); 32, Male paratype, right spicule, lateral view; 33, Female, tail, lateral view; 34, Male holotype, right spicule, lateral view; 35, Female, head, lateral view; 36, Male paratype, head, lateral view. Scale bars in μm .

first 4 circles anterior to suture complete with small, triangular denticles; next 2 circles posterior to suture incomplete; first with small, round denticles; second with large, triangular denticles. Excretory pore anterior to cephalic setae. Tail conical, terminus acute.

Males ($n = 4$): Length 3.22 mm (3.05–3.57), width at midbody 75.5 (53–86). Head diameter 38 (32–40) at level of cephalic setae; cephalic setae 13.5 (13–14), 3.7 (3–4) long. Amphid 16.5 (14–19) wide. Stoma 26 (24–27) long, 23.8 (21–25) wide. Esophagus 709.8 (598–792) long; nerve ring 210.5 (194–

219) from anterior end. Tail 168.5 (128–184) long, 46 (38–50) wide at anus. Two midventral, cuticularized, cup-shaped, pre-anal supplements present 130.5 (70–160) and 211.8 (101–272) anterior to anus. Posterior apophysis of each supplement about twice size of anterior apophysis; rim of cup not striated. Two pairs circular, subventral, plaque-like papillae between anus and first pre-anal supplement. Two pairs small, subventral setae immediately anterior to anus. Spicules straight, broad, 50 (45–54) long. Gubernaculum absent. $a = 44.0$ (36.6–57.4); $b = 4.57$ (4.36–5.10); $c = 19.5$ (17.1–23.8).

Females ($n = 3$): Length 4.19 mm (3.24–4.90), width at midbody 90 (80–104). Head diameter 42.3 (40–45) at level of cephalic setae; cephalic setae 14.7 (14–16), 3.7 (3–4) long. Amphid 17.3 (16–19) wide. Stoma 30.3 (27–32), 27.7 (26–30) wide. Esophagus 1.03 mm (0.843–1.15) long; nerve ring 236.7 (213–259) from anterior end. Tail 282.6 (248–328) long, 50 (48–51) wide at anus. Caudal setae sparse. Vulva 2.46 mm (1.83–2.94) from anterior end. $a = 47.8$ (31.2–57.0); $b = 4.04$ (3.84–4.26); $c = 14.8$ (13.1–16.3); $V = 58.3\%$ (56–60).

Type-specimens.—Holotype male, USNM 77152; paratype males, USNM 77153–77154; allotype female, USNM 77155; paratype female, USNM 77156. Paratype male, FNC A-143; paratype female, FNC A-145.

Locality.—Holotype male nonvegetated sediments from the mouth of Freshwater Bayou, St. Andrew Bay, Bay County, Florida (85°39'00"W, 30°07'30"N). Other site, nonvegetated sediments in Grand Lagoon off St. Andrew Bay, Bay County, Florida (85°43'15"W, 30°07'50"N).

Etymology.—From the Greek halimos meaning pertaining to the sea.

Remarks.—*Paurystomina alima* is most similar to *P. parafloridensis* in the stomatal characters. It differs in the greater number of circles of denticles (6 vs. 5), in the shape and size of the denticles in the posterior-most two circles, and the denticles in each

circle are smaller. *P. alima* males differ from *P. parafloridensis* in the absence of a gubernaculum and in the short straight spicule. *P. alima* is similar to *P. agubernacula* Keppner, 1986, in the absence of a gubernaculum and the presence of a short straight spicule. It differs from *P. agubernacula* in the greater number of circles of denticles (6 vs. 2) and shape and length of the spicules (45–54 vs. 25–27).

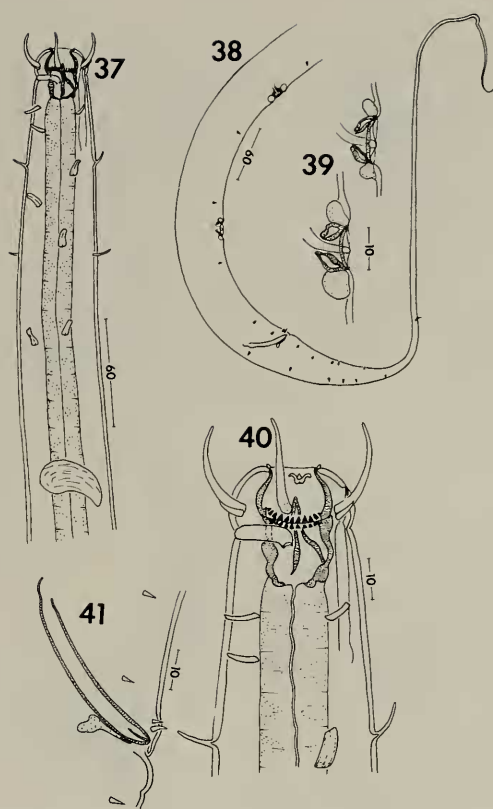
Pareurystomina flagellicaudata

Stekhoven, 1946

Figs. 37–41

Diagnosis.—(One male from site in Gulf of Mexico, Bay County, Florida.) Body very long, slender. Four submedian cephalic setae about $\frac{1}{3}$ length of other 6. Flat cervical setae short, broad; present from base of stoma to about $\frac{2}{3}$ distance to nerve ring. Somatic setae and caudal setae sparse. Amphid just posterior to midlevel of stoma. Denticles in 2 circles, one complete circle large, triangular denticles anterior to suture, one incomplete circle large, triangular denticles posterior to suture. Excretory pore anterior to cephalic setae. Tail conical then flagellate with acute terminus.

Male (n = 1): Length 7.83 mm, width at midbody 48. Head diameter 30 at level of cephalic setae; cephalic setae 22 and 7 long. Amphid 14 wide. Stoma 29 long, 18 wide. Esophagus 782 long; nerve ring 248 from anterior end. Tail 600 long and 45 wide at anus. Two cuticularized, cup-shaped, mid-ventral supplements present 139 and 304 anterior to anus. Anterior and posterior apophyses of each supplement about equal; rim of cup not striated. Two pairs subventral setae immediately anterior to anus; subventral and dorsolateral setae present from anus to just anterior to anterior supplement. Conical portion of tail with numerous small setae. Spicules almost straight, 48 long with blunt tip. Gubernaculum with short, weakly cuticularized apophysis 6 long, corpus a thin distal extension. a = 163; b = 10.0; c = 13.5

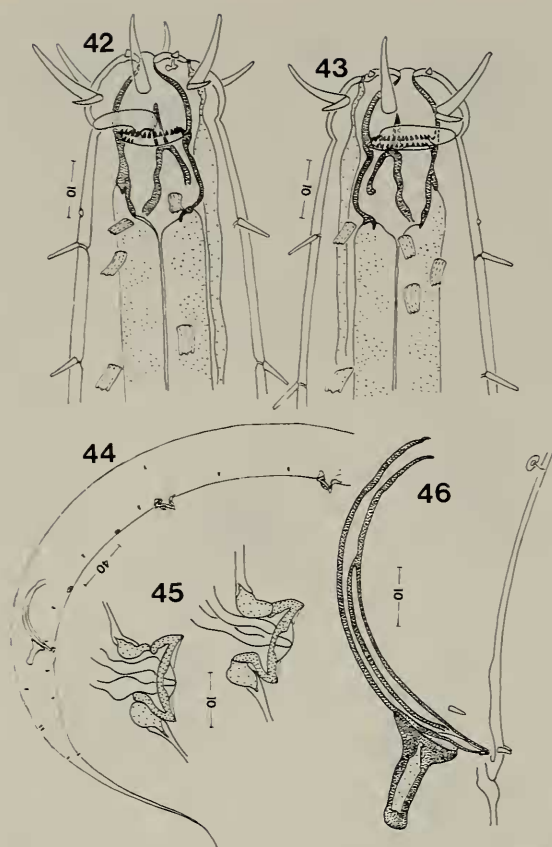


Figs. 37–41. *Pareurystomina flagellicaudata*: 37, Male, anterior end, lateral view; 38, Male, posterior end, lateral view; 39, Male, pre-anal supplements, lateral view (posterior, top; anterior, bottom); 40, Male, head, lateral view; 41, Male, right spicule and gubernaculum, lateral view. Scale bars in μm .

Specimen.—One male, USNM 77157.

Locality.—Coarse sand and shell near ledge in water 24 m deep in the Gulf of Mexico, Bay County, Florida (85°49'30"W, 30°01'30"N).

Remarks.—*Pareurystomina flagellicaudata* was described from a single female specimen. Hopper (1963) observed a specimen of *P. flagellicaudata* from Woods Hole, Massachusetts U.S.A., but did not mention the sex or provide figures of the specimen. To the writer's knowledge, the male of this species has not been described. The specimen described above is considered to be *P. flagellicaudata* based upon the number of rows of denticles in the stoma and the length of the tail. It differs from the original description in the length of the cephalic setae and in having distinctly flattened cervical setae. However, the original description did not figure or state that the cervical setae



Figs. 42–46. *Pareurystomina acuminata*: 42, Male, head, right lateral view; 43, Male, head, left lateral view; 44, Male, posterior end, lateral view; 45, Male, pre-anal supplements, lateral view (posterior, left; anterior, right); 46, Male, right spicule and gubernaculum, lateral view. Scale bars in μm .

were flat or not, and the position of the excretory pore was not mentioned.

Pareurystomina acuminata

(De Man, 1889)

Figs. 42–46

Diagnosis. —(one male from sediment in St. Andrew Bay.) Body long, slender. Four submedian cephalic setae about $\frac{1}{3}$ length of other 6. Flat cervical setae broad, restricted to region just posterior to stoma. Somatic and caudal setae sparse. Amphid wide, anterior to stomatal suture. Two circles triangular denticles present anterior to stomatal suture, posterior circle incomplete with slightly smaller denticles; denticles absent posterior to suture. Excretory pore anterior to cephalic setae. Tail conical, tapers rapidly to acute terminus.

Male ($n = 1$): Length 3.50 mm, width at midbody 37. Head diameter at level of cephalic setae 24; cephalic setae 15 and 5 long. Amphid 13 wide. Stoma 28 long, 14 wide. Esophagus 651 long; nerve ring 194 from anterior end. Tail 235 long, 37 wide at anus. Two midventral, cuticularized, cup-shaped, pre-anal supplements present 165 and 309 anterior to anus. Anterior and posterior apophyses of each supplement about equal. Two pairs subventral papillae between anus and first pre-anal supplement. Single pair subventral setae immediately anterior to anus. Spicules 55 (chord), 72 (arc) long, strongly arcuate, tip with narrow velum and small lateral barb. Corpus of gubernaculum 14 long, does not surround spicules; gubernacular apophysis 16 long, straight, broad, heavily cuticularized, directed postero-dorsally. $a = 94.4$; $b = 5.38$; $c = 14.9$.

Specimen. —Male, USNM 77158.

Locality. —Coarse sand and shell from water about 9 m deep in St. Andrew Bay off the mouth of Freshwater Bayou, Bay County, Florida (85°39'17"W, 30°07'45"N).

Remarks. —Gerlach (1952) described a male of *P. acuminata* and figured the amphid as spiral in shape. Blome (1974) described two males of *P. acuminata* and figured the amphid as a loose spiral. Neither author mentioned or figured the position of the excretory pore, and both figured the cervical setae as not flattened. The specimen described herein as *P. acuminata* is similar in all important characters to those described above with the exception of the shape of the amphid and the presence of flat cervical setae.

Hopper (1963) described a female nematode collected at Gulf Shores, Alabama, U.S.A. as *P. acuminata*. However, this specimen has three circles of denticles in the stoma, a long tail, an oblong amphid, and the cephalic setae are shorter than those described for *P. acuminata*. The description and figures given by Hopper (1963) appear to be that of *P. americana* n. sp. with the exception of the absence of flat cervical se-

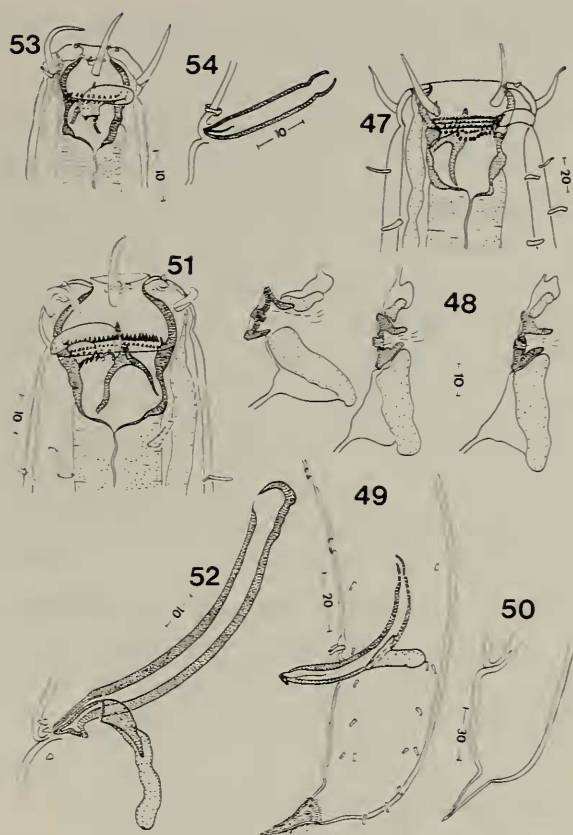
tae. The cervical setae in *P. americana* are narrow and could be overlooked. Therefore, *P. acuminata* sensu Hopper (1963) is considered to be a synonym of *P. americana*.

Pareurystomina bissonettei Hopper, 1970
Figs. 47–50

This species was the second most abundant *Pareurystomina* collected (20 males, 14 females, and 9 juveniles). It was present in nonvegetated and vegetated, shallow water, estuarine sediments and one male was obtained from nonvegetated sediments in the Gulf of Mexico. Specimens agree with the description given by Hopper (1970). The notable exception is the male collected in the Gulf of Mexico. This male is appreciably larger but morphologically similar to the males from shallow, estuarine sediments. The body measurements are about equally proportional to the smaller estuarine males. A description of this male follows.

Diagnosis.—Body long, slender. Large, vacuolated, subcuticular cells present in addition to the hypodermal gland cells. Four submedian cephalic setae about $\frac{1}{4}$ length of other 6. Flat cervical setae short, narrow, extend about $\frac{1}{2}$ distance to nerve ring. Somatic setae short, sparse; caudal setae narrow, flattened in males. Amphid wide, at midlevel of stoma. Denticles in 5 circles; those in 2 posterior circles slightly larger than those in anterior circles. Tail short, with narrow terminal spike with minute spines.

Male ($n = 1$): Length 7.56 mm, width at midbody 107. Head diameter 85 at level of cephalic setae; cephalic setae 40 and 11 long. Stoma 66 long, 56 wide. Amphid 35 wide. Esophagus 1.70 mm long; nerve ring 320 from anterior end. Tail 145 long, 88 wide at anus; caudal setae numerous. Two cuticularized, cup-shaped, midventral, pre-anal supplements present 221 and 422 anterior to anus. Cup of each supplement with 4 arms each with striated distal terminus; arms directed anteriorly, posteriorly, and laterally. Posterior apophysis of each supple-



Figs. 47–54. *Pareurystomina bissonettei*: 47, Male, head, sublateral view; 48, Male, pre-anal supplements, lateral view (anterior, left; posterior, right); 49, Male, posterior end, lateral view; 50, Female, tail, lateral view. *Pareurystomina floridensis*: 51, Male, head, lateral view; 52, Male, left spicule and gubernaculum, lateral view. *Pareurystomina agubernacula*: 53, Male, head, lateral view; 54, Male, left spicule, lateral view. Scale bars in μm for all figs.

ment very large, anterior apophysis small. Two pairs subventral papillae between anus and first pre-anal supplement. Single pair subventral setae immediately anterior to anus. Spicules 128 long, arcuate with small barb at tip. Corpus of gubernaculum does not surround spicules; gubernacular apophysis 26 long, directed dorsally. $a = 70.7$; $b = 4.45$; $c = 52.1$

Specimen.—One male, USNM 77165; other males, 77159–77163; females, 77164 and 77166. Two males, FNC, A-147, A-148, A-149; female, A-150.

Locality.—Coarse sand and shell near ledge in water about 24 m deep, Gulf of Mexico, Bay County, Florida ($85^{\circ}49'30''\text{W}$, $30^{\circ}01'30''\text{N}$). Other specimens from various sites in St. Andrew Bay, Florida.

Pareurystomina floridensis Keppner, 1986
Figs. 51–52

This species was the most abundant encountered during this study (33 males, 16 females, and 6 juveniles). It was recovered only from shallow water, nonvegetated sediments at a variety of sites in St. Andrew Bay and Lake Powell, Bay County, Florida. Examination of specimens recovered after the original description reveals that in some of the specimens there is an additional, partial circle of very small, round denticles present just anterior to the stomatal suture in addition to the three circles originally described. The apophysis of the gubernaculum in the specimens examine curves slightly ventrally at the tip. Figures are included for comparative purposes.

Pareurystomina agubernacula
Keppner, 1986
Figs. 53–54

This species has not been recovered since the original description, and the figures are included for comparative purposes.

Megeurystomina combesi
Luc & De Coninck, 1959

Luc & De Coninck (1959) described a new genus and species of Eurystomininae, *Megeurystomina combesi*. They differentiated the genus *Megeurystomina* from *Pareurystomina* on the basis of the short length of the tail, the structure of the head particularly its ability to retract and protract, and body size (10 mm and greater) in *Megeurystomina*. Lamshead & Platt (1979) considered *Megeurystomina* to be a dubious genus due to the absence of a description of the male. The tail length (2 anal diameters), as a generic character for *Megeurystomina*, is contradicted by *P. bissonettei* that also has a short tail (1.5–2.5 anal diameters). The large male of *P. bissonettei* collected during this study from the Gulf of Mexico is about 1.6 times larger than the average *P. bissonettei* male collected from inshore waters.

This reduces the importance of body size as a generic character for *Megeurystomina*. The retracted head observed in some of the specimens examined during this study reduces the importance of this as a generic character. *M. combesi*, therefore, may be a large form of a species of *Pareurystomina*. The structure of the head is similar to that of the species of *Pareurystomina* with five or six circles of stomatal denticles. For these reasons, *Megeurystomina* is considered to be a synonym of *Pareurystomina* and the species *Pareurystomina combesi* (Luc & De Coninck, 1959) n. comb. is included in the key. It can be differentiated from the other species on the basis of the number of circles of denticles in the stoma, the position of the excretory pore, and the tail length.

Key to Species of
Adult *Pareurystomina*

The taxonomic history of the genus *Pareurystomina* is similar to that of the genus *Eurystomina* Filipjev, 1921, with regard to the characters of importance in differentiating species. Wieser (1953) stressed the importance of the characters of the head in distinguishing the species of *Eurystomina*. Inglis (1962) stressed the importance of the male genital apparatus, particularly the shape of the gubernaculum, in distinguishing the species of *Eurystomina*, and Yeates (1967) agreed with this approach. Wieser & Hopper (1967) recognized the value of using a combination of characters involving the head and male genital apparatus. As in the *Eurystomina*, the identification of the species of *Pareurystomina* is best achieved when males are available for study.

In the following key, the maximum number of circles of denticles in the stoma, position of the excretory pore, and tail length are used to differentiate those species for which only females are known. The use of these characters allowed all species previously described to be placed in the key with the exception of *P. parapugetensis* Vitiello, 1970, described from one juvenile and *P.*

tenuissima (Filipjev, 1927) Filipjev 1946 described from one female. Both species could not be placed in the key because the position of the excretory pore is unknown. Therefore, these two species remain species dubiae in accordance with Lambshhead & Platt (1979). The presence or absence of flat cervical setae was not used in the key because their presence on the species described prior to Hopper (1970) is uncertain.

1. Circles of denticles present in stoma 2
- Circles of denticles absent from stoma
...*P. tenuicauda* Stekhoven, 1950
- 2(1). One to two circles of denticles in stoma 3
- Three or more circles of denticles in stoma 11
- 3(2). One circle of denticles in stoma 4
- Two circles or denticles in stoma 5
- 4(3). Tail 18 anal diameters long .
.....*P. filicaudata* Allgen, 1934
- Tail 4.5 anal diameters long
... *P. typica* Micoletzky & Kreis, 1930
- 5(3). Excretory pore posterior to base of stoma 6
- Excretory pore anterior to base of stoma 7
- 6(5). Stoma twice as long as wide; tail 10–11 anal diameters long (male unknown)
... *P. biserialis* Stekhoven, 1946
- Stoma about 1.5 times as long as wide; tail less than 10 anal diameters long; spicules slender with recurved tip
..... *P. atypica* Chitwood, 1960
- 7(5). Excretory pore at cephalic groove; amphid 31% of head diameter; tail 6 anal diameters long (male unknown)
.. *P. armorica* Luc & De Coninck, 1959

- Excretory pore anterior to cephalic groove and setae; amphid greater than 40% of head diameter; tail less than 6 anal diameters long 8
- 8(7). Gubernaculum absent; spicules straight
.. *P. agubernacula* Keppner, 1986
- Gubernaculum present; spicules straight to curved 9
- 9(8). Gubernacular apophysis reduced; spicules straight; tail 15 anal diameters long
... *P. flagellicaudata* Stekhoven, 1946
- Gubernacular apophysis distinct, elongate; spicules curved; tail less than 6 anal diameters long 10
- 10(9). Spicules thin, strongly arcuate, tip not recurved, with small lateral barb; corpus of gubernaculum elongate, does not surround spicules; gubernacular apophysis straight, directed postero-dorsally
.. *P. acuminata* (De Man, 1889)
- Spicules broad, gently curved, tip recurved, small lateral barb absent; corpus of gubernaculum cone-shaped, surrounds spicules; gubernacular apophysis straight, directed dorsally
..... *P. vaughtae*, n. sp.
- 11(2). Tail short, cylindrical, abruptly narrows to terminal spike with minute spines in male, terminal spines absent in female *P. bissonettei* Hopper, 1970
- Tail conical, tip without minute spines in males and females 12
- 12(11). Stoma with 5–6 circles of denticles, denticles in circles anterior to stomatal suture small and of equal size 13
- Stoma with 3–4 circles of denticles, denticles in circles an-

- terior to stomatal suture equal or unequal in size 15
- 13(12). Excretory pore posterior to cephalic groove; tail short (2 anal diameters) .. *P. combesi*, n. comb.
- Excretory pore anterior to cephalic groove and setae; tail longer (4 anal diameters or more) 14
- 14(13). Stoma with 5 circles of denticles; spicules curved, tip recurved with terminal barb; gubernaculum present; female cephalic setae 45% and amphid 50% of head diameter *P. parafloridensis*, n. sp.
- Stoma with 6 circles of denticles; spicules straight, tip without terminal barb; gubernaculum absent; female cephalic setae 35% and amphid 40% of head diameter ... *P. alima*, n. sp.
- 15(12). Tail 14 anal diameters long *P. micoletzkyi* Filipjev, 1946
- Tail less than 10 anal diameters long 16
- 16(15). Spicules without terminal barb; gubernacular apophysis bent dorsally at midpoint; male post-anal papillae absent *P. americana*, n. sp.
- Spicules with terminal barb; gubernacular apophysis not bent dorsally at midpoint; male post-anal papillae present or absent 17
- 17(16). Male post-anal papillae absent; spicules with broad, cup-shaped tip with large barb *P. floridensis* Keppner, 1986
- Male post-anal papillae present; spicules with narrow tip and small barb 18
- 18(17). Male post-anal papillae about ½ distance from anus to tail tip; gubernacular apophysis short, directed dorsally *P. scillionensis* Warwick, 1977

- Male post-anal papillae immediately post-anal; gubernacular apophysis long, directed postero-dorsally *P. pugetensis* Wieser, 1959

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